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their coefficients are circulating functions, and to resolve them it is clear that they must be reduced to equations of the ordinary kind, and one of the most important objects of the preceding theorems is to show how this may be best effected.

The following is a simple instance of a circulating equation—

$$u_{x+2} \pm P_x \cdot u_{x+1} \pm u_x = 0,$$

in which  $P_x$  is a circulating function of the second degree, or in which  $n=2$  and  $P_x = a.S_x + \beta.S_{x-1}$ .

Now there are various ways of solving such an equation as this, but the following, by J. F. W. Herschell, A.M., &c., is one of the most simple:—

$$\text{Let } u_x = v_x \sqrt{P_x},$$

$$\text{then } u_{x+2} = v_{x+2} \sqrt{P_{x+2}} = v_{x+2} \sqrt{P_x},$$

by theorem 5; hence, by substitution, we have

$$v_{x+2} \sqrt{P_x} \pm P_x \cdot v_{x+1} \sqrt{P_{x+1}} \pm v_x \sqrt{P_x} = 0;$$

$$\text{or, } v_{x+2} \pm v_{x+1} \sqrt{P_x \cdot P_{x-1}} \pm v_x = 0;$$

but, by theorem 5, the functional product  $P_x \cdot P_{x-1}$  is *invariable* and  $= a.b$ ;  $\therefore$  our equation becomes

$$v_{x+2} \pm \sqrt{ab} \cdot v_{x+1} \pm v_x = 0,$$

being an ordinary equation with constant coefficients, and easily integrated by the usual methods.

*Obs.*—In the next Number of the *Journal*, I hope to give a more general process of solving such equations as these, by assuming for the independent variables a circulating function with unknown and variable coefficients, which will be found to apply to all kinds of circulating equations, together with a method of integrating equations involving circulating functions with different periods of circulation, with the application of the preceding theorems to some useful and interesting questions in the doctrine of compound interest annuities, continued fractions, &c., &c.

#### *Forms of Endorsement on Policies used in the Practice of Life Assurance.*

AS the forms above referred to are now numerous, and in constant requisition, we have thought that, by collecting some of them together and putting them into print, we might be affording certain facilities for, and leading the way to, more uniformity of practice in this particular than has hitherto been attainable. We, accord-

ingly, append such specimens as we have been able to get together, and shall be obliged to any of our readers who will afford us the means of adding to their number, or who will suggest any improvements in their construction. Most of those now given have been in use for many years amongst some of the older Companies. It is quite possible that amongst those of more recent date better forms are rife, and we shall be very glad if the publication of these prove the means of bringing such to light.—ED. *A. M.*

FORM OF ENDORSEMENT FOR CONVERTING A TERM POLICY INTO ONE FOR AN ENDOWMENT ASSURANCE.

In consideration of the (annual, half-yearly, or quarterly) payment of the within-mentioned premium, and a due fulfilment of all the other conditions of this policy, it is hereby agreed that, in the event of the said .....surviving the term of.....years, the sum assured shall be payable to him (the assured, his executors, administrators, or assigns) or his assigns at the expiration of three calendar months after the.....day of....., which shall be in the year 185....., should the same not have been previously claimed under the provisions within recited.

FOR ALLOWING A PORTION OF THE PREMIUM TO REMAIN ON CREDIT.

It is hereby agreed that the within assurance shall be and remain in full force on payment of two thirds of the annual premium of £..... within mentioned, the other one third remaining at 5 per cent. interest, as a charge upon the sum assured, to be deducted (if not previously paid up) when the said sum shall become payable: Provided always that the interest due on such amount as may be in arrear be paid annually, and, during the first five years, in advance: Provided also that the amount in arrear never exceed five thirds of the annual premium, that is to say £..... In accordance with this agreement, the said assured hath paid the sum of £....., and £.....interest, in lieu of the annual premium of £.....within mentioned.

FOR ALTERATION FROM ANNUAL TO HALF-YEARLY OR QUARTERLY PAYMENTS.

It is hereby agreed that, in lieu of the annual premium within mentioned, a half-yearly (or quarterly) premium of £.....shall be payable in respect of this policy on the.....day of.....in this year, and on the.....day of.....and the.....day of.....in each and every succeeding year during its continuance, the within-named.....having paid the sum of £.....as the premium on this policy to the.....day of....., 185....., in lieu of the sum of £.....herein mentioned.

FOR ALTERATION IN DATE OF PAYMENT.

In consideration of the payment made this day of the sum of £....., the receipt whereof is hereby acknowledged, it is hereby agreed that this

assurance shall remain in full force until the.....day of.....next inclusive, and that the annual (half-yearly or quarterly) premium within mentioned of £.....shall in future be payable on the.....day of.....in each year, anything within contained to the contrary notwithstanding.

FOR ALTERATION FROM A NON-PARTICIPATING POLICY TO A PARTICIPATING ONE.

In consideration of the said.....having this day paid the sum of £....., the receipt whereof is hereby acknowledged, and agreeing to pay the like sum annually, during the continuance of the within-written policy, on the.....day of....., instead of the sum of £.....within stated, it is hereby agreed that the assured shall henceforth be entitled to participate in the future profits of this Company.

FOR CORRECTING ERRORS IN AGE AND CHRISTIAN NAME CONJOINTLY.

Satisfactory evidence having been produced that the within-named.....was in his.....year at the date of this assurance, instead of in his....., as stated in the proposal, it is hereby agreed that this policy shall be, and remain, in full force on payment now of the sum of £....., and on payment in future of the annual premium of £....., instead of £.....herein stipulated for; and it is hereby admitted that the age is now correctly stated, and that the proper designation of the within-named.....is....., evidence having also been produced to that effect.

FOR CORRECTING AN ERROR IN THE CHRISTIAN NAME.

Evidence having been produced that the within-named.....was baptized as....., and not as....., it is hereby admitted that his proper designation is.....accordingly.

FOR LICENCE TO PROCEED AND TO RESIDE BEYOND THE USUAL LIMITS.

In consideration of the payment this day of £....., the receipt whereof is hereby acknowledged, and of an additional annual payment of £....., to be made on the.....day of.....in this and the following years, so long as this licence may be required, it is hereby agreed that the within-named.....shall have leave to proceed to....., reside there, and return to Europe, anything within contained to the contrary notwithstanding.

FOR LICENCE TO SERVE AS A MARINER.

In consideration of the payment this day of £....., the receipt whereof is hereby acknowledged, and of an additional annual payment of £....., to be made on the.....day of.....in this and the following years, so long as this licence may be required, it is hereby agreed that the within-named.....shall have leave to follow the occupation of master mariner, anything within contained to the contrary notwithstanding.

FOR PROTECTION OF THE ASSURED WHEN THE LIFE ASSURED PROCEEDS  
BEYOND LIMITS WITHOUT HIS KNOWLEDGE.

It is hereby agreed that, should the within-named.....go, without licence, beyond the limits prescribed by this policy, this assurance shall, nevertheless, remain in full force and effect, provided the assured or his representatives shall, within fourteen days of such event coming to his knowledge, pay the additional premium usually required for the risk incurred.

FOR TRANSFER OF A POLICY FROM ONE COMPANY TO ANOTHER.

In consideration of the within-named.....agreeing to the transfer of this policy to the.....Insurance Company, to pay to that Company all future premiums as they become due, and to observe and perform all the stipulations contained therein on his part, we do hereby agree to observe and perform all the stipulations contained therein on the part of the.....Company.

Before the reduction took place in the rate of duty charged by the Government on life policies, it was very generally the practice, amongst Offices effecting reassurances, to accept, instead of the usual policy, an endorsement on a copy of the original one. Since the reduction, however, the practice has, we believe, been for the most part abandoned, and policies are now almost universally issued whether the assurance be made on behalf of an individual or of a Company. The endorsement system was attended with certain advantages—amongst others with that of establishing a complete identity in the risk to which each Company was liable. The same thing, however, is now pretty well effected by merely referring in the declaration to the papers connected with the original proposition, no fresh matter being introduced; and the two contracts are thus made to stand upon very nearly the like footing, whilst a proper uniformity is, at the same time, preserved in official practice.

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*On the Progress of Fire Insurance in Great Britain, as compared with other Countries.* By SAMUEL BROWN, F.S.S.

(Concluded from p. 349, vol. vii.)

X.—*Fire Insurance in America.*

THE returns of the various Insurance Companies are published in some of the United States, so that if all the facts were fully stated as required, a fair estimate could be formed of the extension of the business of the Companies from year to year, with their premiums, capital, reserve, &c. Those of the commonwealth of